Mexican data for July, 1900.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Durango (Seminario)	6,243	24.03	93.2	50.0	69.6	63	9.78	wsw.	e.
Leon (Guanajuato)...	5,934	24.27	87.1	55.4	69.3	68	6.79	sse.	se.
Mazatlan	25	29.84	90.7	74.8	83.5	77	10.88	nw.	ne.
Mexico (Obs. Cent.)..	7,472	23.04	81.3	51.3	62.2	71	5.79	n.	ne.
Morelia (Seminario)..	6,401	23.95	77.4	53.6	64.2	81	5.63	sw.	e.
Puebla (Col. Cat.)....	7,112	23.36	79.7	49.1	65.5	77	9.03	e.	ne.
Saltillo (Col. S. Juan).	5,399	24.77	87.8	59.0	71.6	71	5.70	n.	se.
Zacatetas	8,015	22.49	80.6	47.8	62.6	60	11.69	e.	
Zapotlan (Sem.)......	5,078	25.07	82.0	61.2	69.4	76	5.20	sse.	se.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological observations at Honolulu, July, 1900.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local or 7:31 p. m. (not 1 p. m.), Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature. Dry bulb.	Temperature. Wet bulb.	During twenty-four hours preceding 1 p. m., Greenwich time, or 2:29 a. m., Honolulu time. Temperature. Maximum.	Temperature. Minimum.	Means. Dew-point.	Means. Relative humidity.	Wind. Prevailing direction.	Wind. Force.	Average cloudiness.	Sea-level pressures. Maximum.	Sea-level pressures. Minimum.	Total rainfall at 9 a. m., local time.
	*	†	†			‡	‡		§				
1.....	30.00	77	69.5	85	76	.....	.....	ne.	4-5	5	30.02	29.96	0.01
2.....	30 00	76	69.5	86	76	65.7	62	ne.	4-2	5	30.04	29.97	0.03
3.....	29.97	73	69.5	85	75	66.7	66	ene.	3-1	4-8	30.01	29.96	0.13
4.....	29.97	72	69	84	71	68.5	75	ne.	3	3-8	30.01	29.94	0.07
5.....	29.98	75	69	85	75	69.5	79	ene.	3	5	30.02	29.95	0.15
6.....	29.96	74	69	85	71	67.3	69	ne.	3	6	30.02	29.94	0.08
7.....	29.98	76	69	85	70	67.3	69	ne-nne.	4	4	30.00	29.94	0.00
8.....	30.00	77	69	86	75	66.8	65	nne.	3	3	30.00	29.96	0.01
9.....	30.03	76	68	85	76	66.5	66	ene.	4	3	30.04	29.99	0.00
10.....	29.94	72	70	86	75	65.5	64	nne.	3	3-1	30.05	29.95	0.41
11.....	29.91	75	70	79	71	69.0	79	ne.	3	8-4	29.99	29.91	0.19
12.....	29.95	74	67.5	84	72	66.7	69	ne.	4	3	29.98	29.93	0.04
13.....	29.96	75	69	85	73	66.0	66	ne.	2	5	29.99	29.94	0.06
14.....	29.93	75	68.5	84	72	67.7	72	ne.	3-0	3-8	29.97	29.92	0.14
15.....	29.91	72	69	85	70	67.3	69	ne.	1	4	29.97	29.93	0.01
16.....	29.90	76	69.5	86	72	67.5	71	ne.	1	3	29.97	29.87	0.01
17.....	29.92	75	68	86	74	65.7	63	ne.	1-3	2	29.95	29.88	0.00
18.....	29.97	75	68.5	86	74	66.5	60	ne.	1-3	2	30.00	29.92	0.09
19.....	29.97	77	71	86	72	69.0	65	ne.	3	8-3	30.06	29.97	0.05
20.....	29.93	72	68	86	76	67.7	60	ne.	3	5-1	30.01	29.92	0.02
21.....	29.86	70	66	86	79	65.0	68	nne.	3-4	1	29.97	29.86	0.01
22.....	29.90	73	68.5	87	68	65.7	66	nne.	2	2	29.93	29.86	0.00
23.....	29.92	77	69	86	72	64.5	62	ne.	3	2	29.97	29.90	0.00
24.....	39.95	77	69	86	76	66.0	63	ne.	4	4	29.99	29.93	0.00
25.....	29.94	76	69.5	86	76	65.5	62	nne.	4	2	29.98	29.90	0.04
26.....	29.93	73	68.5	85	74	65.3	63	ne.	4	3	29.95	29.89	0.36
27.....	29.93	76	69.5	83	70	68.0	75	ne.	4-0	5	29.97	29.91	0.15
28.....	29.93	76	71	87	72	67.0	66	ne.	3-0	2	29.99	29.91	0.00
29.....	29.94	77	73	88	75	69.7	72	ene.	3	4-6	30.00	29.94	0.16
30.....	29.94	76	72.5	87	75	70.5	72	ne.	3	4-2	29.98	29.92	0.04
31.....	29.94	75	71	86	76	69.7	73	nne.	4	2	29.98	29.91	0.33
Sums..	......	......	......	......	......	......	......	....	......	......	......	......	2.59
Means.	29.947	74.9	69.3	85.3	73.0	66.9	67.5	....	2.9	3.7	29.994	29.925	....
Departure..	—.035	......	......	......	......	+3.6	+0.8	....	......	—0.3	......	......	+0.79

Mean temperature for July, 1900 (6+2+9) ÷ 3=78.5°; normal is 77.2°. Mean pressure for July (9+3) ÷ 2 is 29.960; normal is 29.995.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4:31 p. m., Greenwich time. ‡ These values are the means of (6+9+2+9) ÷ 4. § Beaufort scale.

FOG STUDIES ON MOUNT TAMALPAIS.

By ALEXANDER G. MCADIE, Forecast Official.

If we lived on a planet without an atmosphere, such as our own satellite, and were suddenly carried to the earth and required to specify what, of all the wonderful things seen, most excited our interest, we would be forced, in perfect fairness, to answer "the floating reservoirs—the clouds." Because we do live on a planet that has an atmosphere, and daily see the never-ending procession of aerial forms marching across the sky we are unable to rightly marvel at the clouds, though we may rightly admire the beauty of the cloudscape. We fail to realize, too, that we are living at the bottom of a sea—a sea of air and not of water. This is a deeper sea than that of the sailing ships, and soundings exceeding 5 miles have recently been made in it. Twilight indicates a sensible atmosphere of perhaps 40 miles, and some measurements of meteoric phenomena would extend the envelope of air to 100 miles; but for all practical purposes the sea of air with which man is concerned may be considered as 5 miles deep. Even so, it is an ocean more vast than the broad Pacific, the ridged Atlantic, the Arctic, the Antarctic, and all the waters of the globe combined. At the bottom of this sea men walk about unconscious of a pressure of nearly one ton on each square foot of their bodies. This pressure is not constant but varies from hour to hour and day by day, sometimes as much as one hundred pounds. Far above move those strangely plastic water carriers, the clouds, and it may be that a longing comes for the wings of a bird that we, too, might journey in the realms of the cloud. But like Prometheus bound to his rock, man seems chained below and wears out his existence at the bottom of the sea of air. Deep sea fishes are structurally adapted to withstand the enormous pressure of the superincumbent layers of water; and man, a deep air animal, is also suited for his habitat. When he wishes to change from one level to another he can laboriously climb the side of some high mountain, realizing as he toils upward that his respiratory system is adapted to low levels. With less physical effort he can rise in an artificial way by balloons, and range through levels with pressure varying from 15 to 5 pounds per square inch. Unlike the birds, however, he can not, unassisted, sound the air. He is outclassed by the eagle. Even the lazy buzzard circling slowly across the sky, soaring without effort over hill and valley, watching with sharp eye the slow-moving animals on earth, has the advantage of man.

The sea of air has even more moods than the sea of water. In the atmosphere the great disturbances are at the bottom while the upper strata are comparatively tranquil. What is called weather is for the most part a displacement of normal strata. Deflection, dipping, or underflowing of some customary air stratum by another, means a marked change in man's environment and naturally he comments freely thereupon.

Few of us realize that the atmosphere is never absolutely at rest. On the calmest day and in the most sheltered nook the air, seemingly still, will be found on closer examination to be in motion. Difference of temperature causes convectional currents, or what we may call gross motion. There are other motions, of which the layman can know but little. The president of the British Association for the Advancement of Science stated in the presidential address for 1898 that—

> The total energy of both the translational and internal motions of the molecules locked up in quiescent air at ordinary pressure and temperature is about 140,000 foot-pounds in each cubic yard of air. Accordingly the quiet air within a room 12 feet high, 18 feet wide, and 22 feet long, contains energy enough to propel a one-horse-power engine for more than twelve hours.

As seaweeds betray the set of the ocean currents, so do clouds betray the aerial steam lines. In studying air drainage, then, let us follow closely the lines and levels of the condensed water vapor. A bank of water vapor (and the vapor is independent of the air) rests like a sediment at the bottom of our sea of air. Under usual conditions a cubic foot of air weighs about 490 grains. A cubic foot of water vapor when the dew-point is 60° weighs about 6 grains. Variation in the amount of water vapor affects man more than change in air. A warm day becomes unbearable if the humidity is high and quite pleasant if the humidity is low. Conversely, a cold day is bracing if dry and doubly disagreeable if damp. It is this water vapor which gives us fog, cloud, snow, rain, hail, frost, and ice. With the aid of fine dust, it gives the wonderful colors of sunset. Like a warm breath upon a window, it may veil the sunlight, and we then call it a cloud.

On the coast of California there is a city justly famed for the abnormalities of its climate. Overcoats and heavy wraps are worn in midsummer and the lilies bloom in December. From May until September almost no rain falls; yet during this period, with clocklike regularity, great banks of fog march in every afternoon and cover the bare, brown hills. Day after day the inhabitants of this city walk about under a sediment of water vapor, knowing that 1,500 feet above, the air is clear and 20° or 30° warmer. Truly, this is an ideal locality in which to study the formation of fog, the birth of the cloud, and to note the shifting of the strata at the bottom of the atmospheric sea. Like an immense blanket, the fog is drawn through the Golden Gate. Below the blanket, all is gray and dreary; above, all is sunshine and delightful weather.

Now, fog, whether it appears for a few hours at certain seasons, as in New York Harbor, or regularly on summer afternoons, as at San Francisco, or for weeks and months, as on the Banks of Newfoundland, indicates air motion. It is, moreover, the first reaction in the process of rain making. The murky town fog of London is seemingly far removed from the pure mists of the Scottish Highlands, and yet the underlying principle of formation is the same. Ground fog, sea fog, town fog, tule fog, and the clouds through all the levels are nature's unfinished efforts at rain making. In that vast laboratory there are many ways of warming and cooling water vapor. One level glides over another and the daintiest of lacelike cirrus clouds are formed; one current rises and another falls, and a sheet of cloud, level as a prairie, marks the plane of condensation. Aerial fleets and flocks appear and disappear as the water vapor is cooled by contact, ascension, mixture, or otherwise. (See the accompanying Plates No. I, II, and III.)

Air motion is, as a rule, initiated by difference in temperature. In the wonderful land of California, owing to peculiar topography, the temperature of the air will often differ as much as 50° in 50 miles. Especially is this the case in the vicinity of the Golden Gate, where on one side the ocean maintains a temperature of about 55°, while a few miles inland the temperature on summer afternoons may reach 110°. Here then one may expect to find well-marked air currents, drafts, and counterdrafts. Here the rain engineer should begin his studies. In the early morning after a night of fog, the city roofs glisten with little pools of water. Wherever the fog impinges on a condensing surface, the water trickles down. One side of a street is wet, the other dry. Under the trees, in the redwood canyons of the slopes of Tamalpais, the drifting fog after caressing the leaves, patters gently to the ground. A few hours earlier this water was in the Pacific; as vapor it traveled perhaps a thousand feet upward. Then settling and chilled by the cold water surface, it was carried inland as fog, and meeting in the leaf a modest but efficient rain maker, turns to water again and flows in part into the sea.

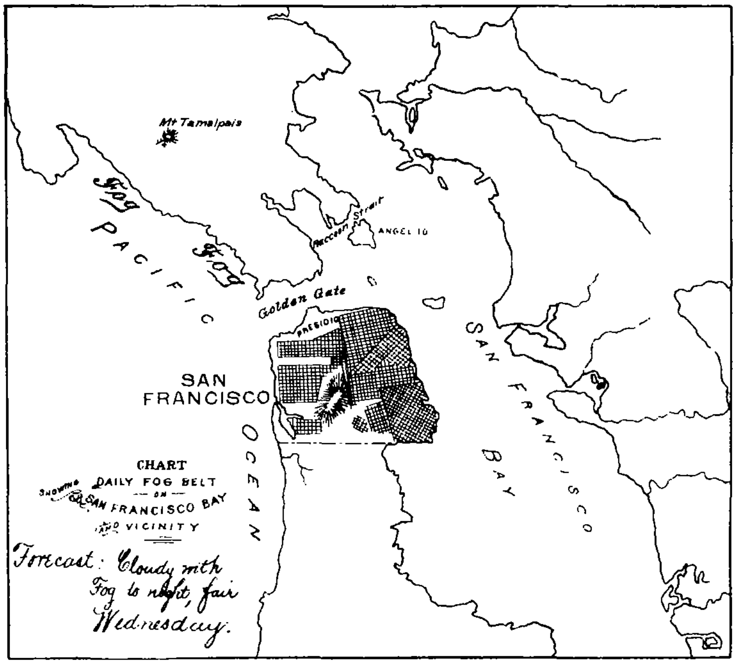

FIG. 1.—Fog service at San Francisco. Corner of large map standing in main corridor of Ferry Building. By means of frequent reports from Point Reyes and Mount Tamalpais the extent and character of fog over Drakes Bay, the roadstead, and the Gate itself are known in the city.

COMPARATIVE DATA FOR SAN FRANCISCO AND MOUNT TAMALPAIS.

In Bulletin No. 28 issued by the Weather Bureau, entitled The Climate of San Francisco, meteorological data pertaining to the City of San Francisco are given up to the beginning of 1899. It is not necessary to repeat here these records; but the data for 1899 being available possess special interest.

Year and month.	Mean monthly temperatures.	
	Mount Tamalpais.	San Francisco.
1899.		
January	47.8	53.0
February	47.6	51.6
March....	44.6	52.2
April	51.6	54.6
May	51.2	52.6
June	66.8	56.9
July	71.0	55.9
August......	61.4	58.3
September..	73.2	58.2
October	55.3	59.3
November ..	49.4	56.8
December...	47.7	49.6
Annual...	55.6	54.9

These temperatures compared with those of 1898 show that the annual mean temperature of both stations for the two years is practically 55°, which is also the mean annual temperature, so far as we can judge from somewhat scattered data, of the ocean in the vicinity of San Francisco. The temperature of the lower station naturally approximates sea conditions throughout the year; while the departures at the more elevated station are marked in both winter and summer.

The highest temperature recorded on the mountain during the year was 96°, on July 18; the maximum temperature on the same date at San Francisco being 66°, and at Point Reyes 52°. It is worthy of note that within so short a distance as 25 miles, between Mount Tamalpais and Point Reyes, there should be a difference of 44°. The highest temperature recorded at San Francisco during 1899 was 94° on October 8, while on this date the maximum temperature on Mount

Tamalpais was 88°, and at Point Reyes 74°. The lowest temperature recorded during the year on the mountain was 23°, on February 4, and on the same date 34° at San Francisco and at Point Reyes. The minimum temperature was, therefore, 11° lower at the higher station. As has been elsewhere stated, during summer months there is very frequently, owing to the fog, a cooling of 11° at the lower station. In all of these instances the retarding influence of the water is apparent; in summer the temperature near the sea remaining cool, and comparatively warm in winter.

The mountain, as might be supposed, is the drier station, the mean relative humidity being 59 per cent, while it is 83° at San Francisco. Especially during the summer months is the difference noticeable, and, doubtless, it is this dryness which causes such an agreeable "change of climate" to visitors at this season. The difference may perhaps be stated more clearly in this way. The weight of water vapor per cubic foot varies from 1.9 grains to 3.5 grains on the mountain during the year. While at San Francisco it varies from 3.3 grains to 4.4 grains. The average hourly wind velocity seems to increase with elevation, the values for the mountain station far exceeding those of the lower station. The maximum velocities recorded are, respectively, 91 and 47. The total wind movement was 177,017 miles at Mount Tamalpais and 96,602 miles at San Francisco.

TABLE 1.—*Comparative climatic data for* 1899.

Stations.	Mean pressure.	Temperature. Annual.	Mean maximum.	Mean minimum.	Highest.	Lowest.	Mean daily range.	Mean daily change.
	Inches.	°	°	°	°	°	°	°
San Francisco	29.87	54.9	61.0	49.0	94	34	11.6	2.6
Mount Tamalpais	27.55	55.7	61.5	49.8	96	23	11.7	4.3
Los Angeles	29.61	61.9	72.7	51.0	100	33	21.7	2.6
San Diego	29.87	60.1	65.5	54.8	93	34	10.7	2.0

Stations.	Dew-point.	Humidity. Weight of vapor.	Relative humidity.	Total rainfall.	Rainy days.
	°	*Grains.*	%	*Inches.*	
San Francisco	48	3.8	83	23.23	67
Mount Tamalpais	36	2.5	59	36.86	92
Los Angeles	49	3.9	73	8.69	31
San Diego	50	4.1	73	6.08	33

Stations.	Wind. Prevailing direction.	Maximum velocity.	Total movement.	Sky conditions. Clear days.	Partly cloudy days.	Cloudy days.	Actual hours of sunshine.	Percentage of sunshine.
		Miles.	*Miles.*					
San Francisco	w.	47 sw.	96,602	185	104	76	3,123	69
Mount Tamalpais	nw.	91 nw.	177,017	196	80	89	3,342	73
Los Angeles	w.	30 e.	36,590	162	167	36	3,272	74
San Diego	nw.	33 se.	50,428	280	40	45	3,174	72

The accompanying tables give in detail the meteorological elements at both stations for 1899, and a comparison of the yearly means with the same at Los Angeles and San Diego, both of which cities are considered popularly as possessing ideal climates.

TABLE 2.—*Mount Tamalpais*, 1899.

	January.	February.	March.	April.	May.	June.
Actual mean pressure	27.62	27.65	27.53	27.54	27.53	27.51
Mean maximum temperature	51.8	53.3	49.5	58.6	58.1	73.9
Mean minimum temperature	43.8	41.9	39.6	44.7	44.3	59.6
Mean monthly temperature	47.8	47.6	44.6	51.6	51.2	66.8
Highest temperature	69	71	69	77	82	86
Lowest temperature	32	23	32	32	33	41
Dew-point	34	29	36	35	35	39
Relative humidity	70	56	77	58	62	43
Total rainfall	5.92	0.28	10.38	1.89	1.70	0.29
Greatest 24-hour rainfall	1.54	0.14	2.51	0.53	1.39	0.24
Mean cloudiness	6.0	3.4	6.7	4.7	4.1	1.8
Average hourly wind velocity	24.0	23.2	22.8	19.8	22.9	19.8
Prevailing wind direction	nw.	nw.	w.	n.	nw.	nw.
Maximum wind velocity	86	84	76	84	78	86
Maximum wind direction	w.	nw.	nw.	nw.	nw.	nw.
Clear days	8	14	7	13	17	24
Partly cloudy days	9	13	7	8	9	5
Cloudy days	14	1	17	9	5	1
Days with .01 rainfall	14	4	17	7	3	3
Days with .04 rainfall	14	2	16	6	3	1
Actual hours sunshine	174.9	263.8	162.6	300.7	344.6	404.5
Percentage of sunshine	57	87	44	76	78	91
Mean daily range of temperature	8.0	11.4	9.9	13.9	13.8	14.3
Mean daily change of temperature	2.8	3.8	4.1	6.3	4.7	6.1
Total wind movement	17,821	15,608	16,986	14,234	17,074	14,257

	July.	August.	September.	October.	November.	December.	Annual.
Mean actual pressure	27.50	27.49	27.56	27.52	27.55	27.62	27.55
Mean maximum temperature	78.2	68.5	79.9	60.7	52.9	52.3	61.5
Mean minimum temperature	63.7	54.2	66.6	49.9	45.9	43.1	49.8
Mean monthly temperature	71.0	61.4	73.3	56.3	49.4	47.7	55.7
Highest temperature	96	79	92	88	61	64	96
Lowest temperature	46	45	47	37	40	34	23
Dew-point	33	39	32	37	46	41	36
Relative humidity	30	50	29	63	91	80	59
Total rainfall	0.00	0.01	0.00	4.26	7.48	4.65	36.86
Greatest 24-hour rainfall	0.00	0.01	0.00	1.32	2.51	0.83	2.51
Mean cloudiness	1.2	2.3	2.0	4.6	8.0	4.6	4.1
Average hourly wind velocity	17.6	16.5	17.1	18.2	16.7	23.9	20.2
Prevailing wind direction	nw.	w.	nw.	nw.	nw.	ne.	nw.
Maximum wind velocity	61	91	66	71	56	76	91
Maximum wind direction	n.	nw.	nw.	nw.	w.	n.	nw.
Clear days	29	24	26	16	2	16	196
Partly cloudy days	2	4	4	5	10	4	80
Cloudy days	0	3	0	10	18	11	89
Days with .01 rainfall	0	1	0	11	19	13	93
Days with .04 rainfall	0	0	0	8	15	12	77
Actual hours sunshine	445.4	373.4	354.7	234.0	105.9	177.7	3,342
Percentage of sunshine	99	88	95	67	85	60	73
Mean daily range of temperature	14.5	14.3	13.3	10.8	7.0	9.3	11.7
Mean daily change of temperature	5.9	4.7	3.4	4.2	2.1	3.1	4.3
Total wind movement	13,108	12,283	12,307	13,561	11,996	17,782	177,017

TABLE 3.—*San Francisco*, 1899.

	January.	February.	March.	April.	May.	June.
Mean actual pressure	29.98	30.00	29.89	29.87	29.87	29.78
Mean maximum temperature	58.3	58.0	57.3	61.2	58.8	63.4
Mean minimum temperature	47.6	45.3	47.1	47.9	46.9	50.4
Mean monthly temperature	53.0	51.6	52.2	54.6	52.6	56.9
Highest temperature	78	80	74	80	80	75
Lowest temperature	40	34	42	43	43	47
Dew-point	46	45	48	45	45	49
Relative humidity	80	82	86	76	79	83
Total rainfall	3.67	0.10	7.61	0.62	0.86	0.01
Greatest 24-hour rainfall	0.98	0.08	2.15	0.46	0.77	0.01
Mean cloudiness	6.7	4.6	6.5	3.0	2.6	2.0
Average hourly wind velocity	7.9	8.7	9.8	11.7	13.9	14.2
Prevailing wind direction	se.	w.	w.	w.	w.	w.
Maximum wind velocity	47	39	36	38	37	44
Maximum wind direction	sw.	w.	w.	w.	w.	w.
Clear days	5	11	6	18	21	23
Partly cloudy days	11	10	9	10	7	5
Cloudy days	15	7	16	2	3	2
Days with .01 rainfall	11	2	15	5	2	1
Days with .04 rainfall	9	1	10	3	2	0
Actual hours sunshine	152.1	215.7	192.9	327.7	365.1	362.4
Percentage of sunshine	50	71	52	88	83	86
Mean daily range of temperature	10.7	12.7	10.2	13.3	11.4	13.0
Mean daily change of temperature	2.0	3.1	2.6	4.3	2.2	3.1
Total wind movement	5,864	5,860	7,316	8,394	10,346	1,019

TABLE 3.—*San Francisco*, 1899—Continued.

	July.	August.	September.	October.	November.	December.	Annual.
Mean actual pressure	29 78	29.78	29.83	29.83	29.88	29.98	29.87
Mean maximum temperature	61.5	63.5	65.1	66.1	61.0	54.8	60.7
Mean minimum temperature	50 3	53.1	51.3	52.5	52 6	44.4	49.1
Mean monthly temperature	55.9	58.3	58.2	59.3	56 8	49.6	54.9
Highest temperature	73	78	73	94	65	63	94
Lowest temperature	48	50	48	46	48	37	34
Dew-point	50	52	52	50	52	44	48
Relative humidity	87	84	89	78	86	83	83
Total rainfall	00.0	T.	00.0	3.92	3.79	2.65	23.23
Greatest 24-hour rainfall	00.0	T.	00.0	1.94	1.51	1.17	2.15
Mean cloudiness	3.6	3.3	3.0	3.0	5.8	3.8	4.0
Average hourly wind velocity	15.3	14.4	12.6	8.5	6.6	8.6	11.0
Prevailing wind direction	sw.	sw.	sw.	w.	se.	n.	w.
Maximum wind velocity	41	39	40	41	30	30	47
Maximum wind direction	w.	w.	w.	w.	sw.	sw.	sw.
Clear days	16	18	20	21	8	18	185
Partly cloudy days	11	11	8	5	11	6	104
Cloudy days	4	2	2	5	11	7	76
Days with .01 rainfall	0	0	0	9	12	10	67
Days with .04 rainfall	0	0	0	6	11	10	52
Actual hours sunshine	294.1	308.4	292.5	272.5	129.1	190.5	312.3
Percentage of sunshine	65	73	78	78	42	64	69
Mean daily range of temperature	11.3	10.4	13.8	13 6	8.4	10.4	11.6
Mean daily change of temperature	2 1	2.0	2.2	3.4	1.9	2.3	2 6
Total wind movement	11,356	10,722	9,066	6,298	4,757	6,430	96,602

ELECTRIC PHENOMENA IN THE EUPHRATES VALLEY.

By ELLSWORTH HUNTINGTON, Euphrates College, Harpoot, Turkey, dated July 21,1900.

During a recent ten days' geological trip through an almost unvisited part of the Taurus Mountains to the south of Harpoot I heard of a phenomenon which I should be glad to have you explain, either by letter or through the columns of the REVIEW. Before leaving Harpoot I was told by a man from Aivose that Keklujek Mountain, near his village, fought with Ziaret Mountain, on the other side of the Euphrates River. The weapons were balls of light, which the mountains threw at each other. As the region was one of volcanic activity in comparatively recent times, and as hot springs and extinct craters are still to be seen, I thought at first that this must be a traditional account of a volcanic eruption. Subsequent investigation, however, showed that the story had its origin in a meteorological phenomenon. At first I was skeptical as to the truth of what follows. After hearing substantially the same story from ten or twelve men whom I saw in five different places separated by an extreme distance of 40 or more miles, I became thoroughly convinced of its truth. It may be a common occurrence, but I have never heard of it and can find no account of it in the few books at my command.

The facts, upon which all agree, are as follows: A ball of fire is sometimes seen to start from one mountain and go like a flash to another. At the same time there is a sound like thunder. This occurs by day or by night, although by day no light is seen. It always occurs when the sky is clear and never when it is cloudy. It sometimes happens two or three times in a year, and then again is not seen for several years. For the last two years it has not been seen. It is most common (or possibly never happens except) in the fall, at the end of the long, dry season of three months. The mountains show no special features different from other mountains. I visited one of them, Karaoghlon (Black Son) Mountain, and found it to be composed of metamorphic schistose shale of cretaceous age. Its height is 7,350 feet, and the top is comparatively flat. One observer said that a glow remained after the flash, but all the rest contradicted this. Another said that the ball of fire was first small, but grew larger as it passed over, and then grew smaller again. He evidently was between the two mountains.

The location and course of the flashes may be seen from the accompanying sketch map. In every case the flash crosses the Euphrates River, which here flows through a deep, pre-

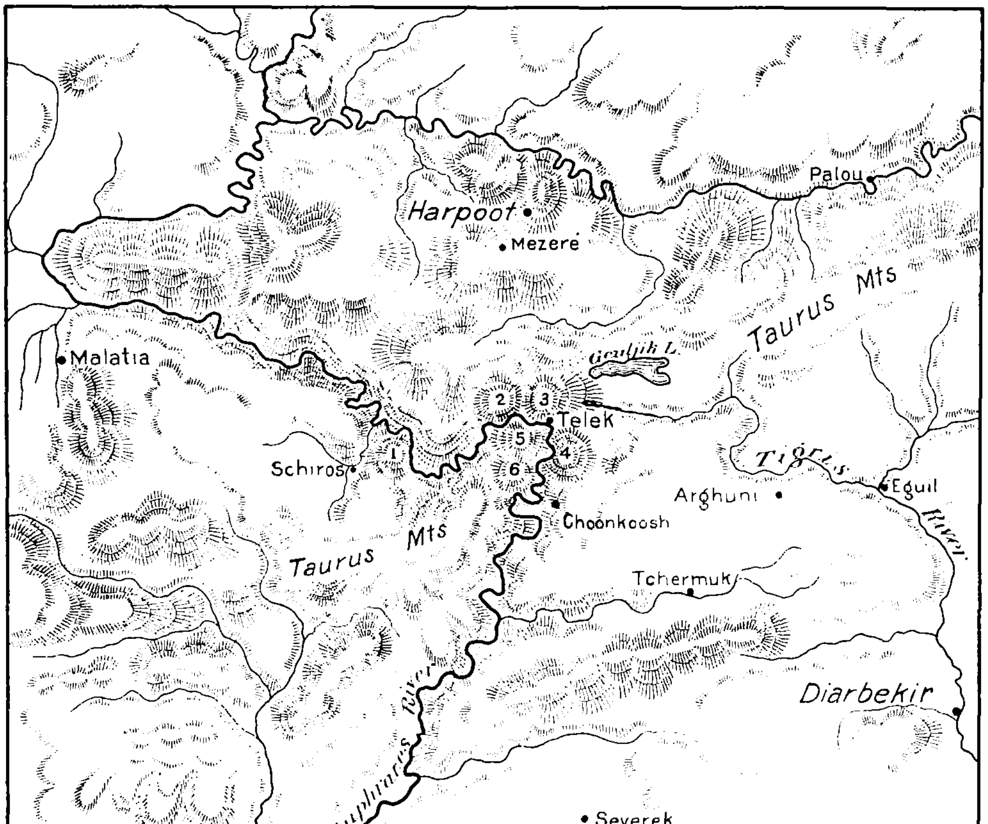

FIG. 2.—Showing mountains 1–6, from which flashes are seen to go. The flashes go between Nos. 1 and 2; 2 and 5; 3 and 5; 4 and 5; and 4 and 6. The names of the mountains are: No. 1, Chakchak, altitude 7,400 feet; No. 2, Keklujek, 6,500 feet; No. 3, Karaoghlon, 7,350 feet; No. 4, Hindi Baba, 5,500 feet; No. 5, Ziaret, 7,500 feet; No. 6, no name.

Plate I. Fog over the Golden Gate. View from U. S. Weather Bureau Observatory, Mount Tamalpais, Cal.

Plate II. Fog streaming in from the Pacific.

Plate III. Valley Fog. Originally sea fog but augmented by radiation about sunset.